PROJECT PROFILE

ENVIRONMENTAL TECHNOLOGY

Ontario

Development of a Nitrate-Specific Gas Chromatograph (GC) Detector for Atmospheric Nitrate Measurement

> *" The Unisearch LND-4 nitrate detector represents an important new addition to our LUMINOX(TM) line of chemiluminescence ambient air monitors. "*

Gervase Mackay
Vice President, Technology
Unisearch Associates Inc.
Concord, Ontario

THE COMPANY

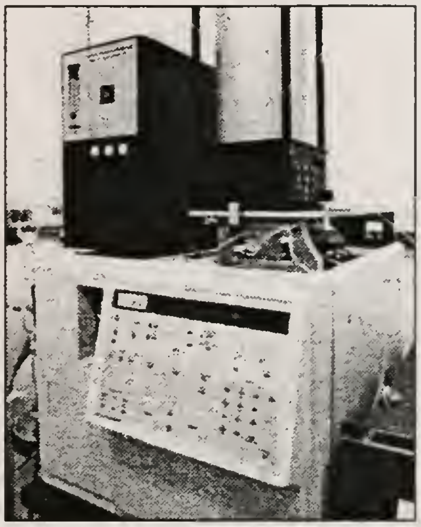
Unisearch was established in 1980 to develop innovative instruments for air measurements. The company pioneered and remains a world leader in Tunable Diode Laser absorption spectroscopy and ultra-sensitive Luminox Chemiluminescence monitors for air measurements. The company's Luminox and LasIR product lines are sold worldwide. The company also provides measurement and air monitoring contract services to organizations across North America.

THE CHALLENGE

Manufactured nitrate compounds are of considerable concern as a health hazard in both urban areas and industrial plants. Currently, the only reliable method of measurement and characterization of these compounds is gas chromatography (GC). In 1990, the company developed the concept for an advanced total nitrate detector based on its patented Luminox technology. The concept design included specific compound detection, digital control and advanced data analysis software at a lower cost than a full GC system.

TECHNOLOGY DESCRIPTION

The Unisearch LND-4 is made up of a glass capillary GC column followed by a dual temperature zone thermal converter and a chemiluminescence (relating to light) nitrogen dioxide (NO_2) detector, the output of which is analysed by a Windows-based data acquisition program.



The Unisearch LND-4 Nitrate Detector

The GC column separates the nitrate compounds and the thermal converter produces an NO_2 molecule for each molecule of the nitrate compounds of interest. The NO_2 detector is calibrated to its highest level to achieve sensitivities compatible to those of an Electron Capture Detector (ECD). A mass flow controller adds oxygen and standard NO_2 to the sample gas leaving the converter in order to correct for anomalies and improve the detection limit. The software also controls the whole process.

RESULTS

The development project resulted in the construction of a research prototype unit which was used by York University and Unisearch for method development, testing and forward development. Extensive tests during 1993 and 1994 demonstrated that the new detector met all of the technical specifications and performed as well as the full GC system.

Based on the research prototype testing and feedback from the York University Research team, a preproduction prototype designated the LND-4 has been designed in co-operation with Purdue University.

TECHNOLOGY OPPORTUNITIES

The market potential for the LND-4 is estimated to be up to 100 units over the next five years.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The development and demonstration of this technology was partially supported by the Ontario Ministry of the Environment. As well, Paul Shepson of York University acted as a research partner.

Industrial companies located in Ontario may seek ministry/industry services which will help them to:

- reduce, reuse and recycle solid waste;
- clean up historic pollution effectively and destroy hazardous contaminants;
- reduce or eliminate liquid effluent and gaseous emissions;
- use energy and water more efficiently.

Equipment and service supply companies can benefit from the information provided on technologies identified for business development.

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